

Section 205. ROADWAY EARTHWORK

205.01 Description. This work shall consist of constructing earth grades by excavating soil or rock and by placing embankments or fills. This work includes salvaging and stockpiling selected materials; furnishing, placing and compacting embankment materials; trimming the earth grade; disposing of surplus or unsuitable material; and maintaining the work in a finished condition until acceptance of the project.

All work to excavate materials, except rock excavation and subgrade undercutting, which is not covered by separate items in the contract will be classified as earth excavation.

All tests pertaining to maximum unit weight and in-place density are those described in the *Density Control Handbook*.

A. **Soil Series Notation and Boring Logs.** Soil series notations and boring logs shown on the plans are for information only and shall not relieve the Contractor of the responsibility of investigating all local conditions before bidding, as specified in subsection 102.04. Detailed data regarding soil series notations are given in the illustrated soil descriptions and glossary of soil terms in the *Field Manual of Soil Engineering*.

B. Terminology Used.

1. **CIP** when used with an embankment item denotes **compacted-in-place**.
2. **LM** when used with an embankment item denotes **loose measure**.
3. **Sound earth** is any natural or other approved material that can be compacted to the required density, contains no organic material, and has a maximum unit weight of at least 95 pounds per cubic foot.
4. **Frost heave textured material** is any material containing more than 50 percent silt particles by weight, and a plasticity index less than 10.
5. **Silt** is any material having a particle size of 0.075 to 0.002 mm.

205.02 Materials.

Granular Material Class II, III	902
Open-Graded Aggregate	902
Geosynthetics	910

Foundry sand that has been used for metal casting will not be permitted.

205.03 Construction.

A. **Preparing Roadway Foundation.** Material shall be removed from the roadway foundation and salvaged or disposed of as specified. The roadway foundation shall be compacted to the depth and density specified.

1. **Removing and Salvaging Topsoil.** Before removing topsoil, all vegetation shall be reduced to a height of approximately 6 inches. All cut vegetation, brush, rocks, and other litter shall be removed and disposed.

Topsoil shall be removed to the required depth from designated areas prior to excavating or placing embankment. Equipment and methods used shall avoid the lifting of subsoil. Topsoil removal operations shall be suspended if soil or weather conditions are unsuitable as determined by the Engineer.

Topsoil stockpiles shall be located and shaped to avoid placement within the drip line of trees that are to be preserved. Topsoil stockpiles shall not be placed in drainage courses or in wetlands. Topsoil from the roadway shall be stockpiled within the right-of-way and outside the limits of construction or used in the slopes as specified. If temporarily stockpiling topsoil outside of the right-of-way, the Contractor shall obtain and file with the Department written permission from the owner of the property upon which the material is to be placed.

Topsoil removal shall take place as follows:

- a. **Peat and Muck Areas.** Topsoil shall not be removed.
 - b. **Borrow and Clear Vision Areas.** Topsoil shall be removed to the depth and width required.
 - c. **Inlet, Outlet, and Berm Ditch Areas.** Topsoil shall be removed within construction limits.
 - d. **Roadway Cut Areas.** Topsoil shall be removed within the grading limits.
 - e. **Roadway Embankment Areas.** Topsoil shall be removed within the grading limits.
2. **Salvaging Materials.** Existing gravel, crushed stone, or selected excavated materials, shall be removed and may be salvaged. Salvaged material may be used as earth shoulders, approaches, temporary roadway surfacing, or other items, as approved. Salvaged material shall not contain foreign or undesirable material. Temporary stockpiling of salvaged material shall be outside the grading limits and within the right-of-way limits as approved. Any excess salvaged material shall become the property of the Contractor and shall be removed prior to project completion. Excess salvaged material stockpiles, when approved to remain on the project, shall be trimmed to present a neat appearance.
 3. **Disposing of Stones, Broken Rock, and Boulders.** Stones, broken rock, and boulders that cannot be incorporated in the work shall be disposed of as required by burying in the ground between the roadway and right-of-way lines, or by disposal outside of the right-of-way. They may be placed in the right-of-way in a safe and scenic manner, if approved. If buried, the top of the stones, broken rock, and boulders shall be at least 12 inches below the natural ground level. If disposed of outside of the right-

of-way, the Contractor shall obtain and file with the Department written permission from the owner of the property upon which the material is to be placed.

- B. **Rock Excavation.** Rock excavation shall consist of excavation of all boulders of 0.5 cubic yard or more in volume and rock or cemented soils that do not soften when wet or cannot be excavated without continuous drilling, blasting, or continuous use of a ripper or other special equipment.

The surface of the rock shall be exposed to permit measurements to be taken before the rock excavation is started. Rock encountered in the excavation shall be removed to the required cross section and according to the following.

1. No rock shall project more than 6 inches above the lines of the required cross section.
2. The backslopes shall be excavated to the neat line slopes shown on the plans, with no rock projecting more than 12 inches from the true slope.
3. The rock surface shall be excavated to provide drainage. Undrained pockets in the surface of the rock will not be allowed.
4. All rock or boulders loosened in the excavation and overhanging ledges, either on or outside the required cross section, shall be removed.

- C. **Peat Excavation.** Peat excavation shall consist of removal of peat, muck, marl, and underlying very soft clay. Peat excavation shall be coordinated with swamp backfill operations.

- D. **Swamp Backfill.** Embankments across peat marshes shall be constructed according to the method specified on the plans. Swamp backfill material shall be granular material Class III. Excavated areas shall be backfilled in conjunction with peat excavation, except where total excavation of peat results in a reasonably dry trench, in which case backfilling may be carried on as separate operations. The backfilling of a reasonably dry trench shall follow immediately upon completion of the excavating operation and shall be done by the controlled density method. Excavating and backfilling peat areas in separate operations will be permitted only in shallow peat areas and must be approved.

The rate of advancement of the embankment and surcharge in deep swamps shall be coordinated with the rate of excavation of the upheaved peat. If a trench of the required depth is not maintained full-width ahead of the surcharge, additional peat excavating equipment shall be used or construction of embankment and surcharge shall be stopped until the two operations are in balance.

Rehandling of waste material to facilitate proper displacement shall be included in the cost of peat excavation.

Peat shall be disposed of as shown on the plans or according to subsection 205.03.P.

Swamp backfill will be bored by the Department to determine if unsuitable material has been completely excavated or displaced. If the borings indicate that unsuitable material is present under the swamp backfill, the Department will determine the corrective action. Borings will be completed, and the Contractor will be notified of any corrective action required, within 60 days after the swamp backfill is completed.

Corrective action may consist of excavating, placing a surcharge, excavating relief trenches, or a combination of these actions.

When a surcharge is to be placed over the swamp backfill, the surcharge shall be constructed to the width and elevation determined by the Engineer. The surcharge shall remain in place until the swamp backfill has stabilized or the required settlement has taken place, as determined by the Engineer.

Material from the surcharge shall become the property of the Contractor.

The surcharge may be required to remain in place for a period not to exceed 90 days.

The pavement structure shall not be placed until the swamp backfill has been approved and all peat excavation and spreading has been completed.

- E. **Subgrade Undercutting.** Subgrade undercutting, including backfilling, shall be performed to replace material susceptible to frost heaving or differential frost action and to remedy unstable soil conditions. Removing topsoil and peat excavation will not be part of subgrade undercutting. Subgrade undercutting will include excavation below subgrade in cut sections; excavation at the transition from cut to fill sections; and any excavation, other than peat excavation, that may be required below the topsoil in fill sections. Excavated material shall become the property of the Contractor.

1. Limits of subgrade undercutting.

- a. After the subgrade has been excavated to the approximate grade, the Engineer will promptly inspect the grade to determine if any subgrade undercutting is required and determine the limits of such undercutting.
- b. Where shallow fills are to be placed, the Engineer will inspect the fill area before any embankment is placed and determine the limits of the subgrade undercutting before placing any embankment.
- c. All deposits of frost heave textured material within lines 2 feet outside the proposed surface, including paved shoulders, shall be removed as follows.

North of the north boundary of Township 12 North, remove to a depth of 4 to 5 feet below the plan grade, and

South of the north boundary of Township 12 North, remove to a depth of 3.5 to 4 feet below the plan grade.

2. **Backfill of Subgrade Undercut.**

- a. Subgrade undercutting Type I shall be backfilled with selected clay or other approved material.
- b. Subgrade undercutting Type II shall be backfilled with granular material Class II.
- c. Subgrade undercutting Type III shall be backfilled with the material excavated from subgrade undercut areas after it has been effectively mixed to break up the undesirable strata of soils or with other approved backfill material.
- d. Backfill of subgrade undercutting shall be compacted to not less than 95 percent of its maximum unit weight.

- F. **Subgrade Manipulation.** Where subgrade manipulation is required, the roadbed subgrade shall be scarified, blended, and mixed to a depth of 12 inches below the top of subgrade. After the subgrade material has been thoroughly mixed, it shall be compacted to not less than 95 percent of its maximum unit weight.
- G. **Earth Excavation.** All excavated materials, except as provided for in subsection 205.03.A, shall become the property of the Contractor.

The subgrade shall be compacted to not less than 95 percent of its maximum unit weight to a depth of at least 10 inches. If the subgrade cannot be compacted to 95 percent of its maximum unit weight, using conventional construction methods, the Engineer may authorize use of other methods to attain compaction.

In cut sections where the existing material appears to meet subbase specifications, the grade shall be constructed to top of subbase rather than to the bottom of subbase, as called for on plans. The Engineer will then make an investigation to determine whether or not the existing material meets subbase requirements. Material meeting subbase requirements shall be shaped to the top of subbase and shall be compacted to not less than 95 percent of its maximum unit weight to a minimum depth of 12 inches. Earthwork quantities shall be adjusted accordingly. Material not meeting subbase requirements shall be excavated to the bottom of subbase. Claims for damage caused by the halting of grading operation for the purpose of making this subbase investigation will not be allowed.

The roadbed and ditches shall be maintained and be well drained at all times. Temporary drainage facilities shall be provided and removed, at the Contractor's expense.

The grading shall be conducted to avoid removing or loosening any material outside of the required slopes. Removed or loosened material shall be replaced and thoroughly compacted to the required density and cross section.

Any surplus or waste material resulting from ditch construction shall be disposed as specified in subsection 205.03.P. Roots, stumps, or other objectionable materials in the slopes and bottom of the ditch shall be removed and the holes backfilled with suitable material. All ditches constructed on the project shall be maintained until final acceptance.

H. Roadway Embankment.

1. **Stepping Side Slope.** Embankments constructed on existing side slopes steeper than 1:6 shall have steps with a horizontal dimension of not less than 3 feet formed in the slope before any of the embankment is placed.
2. **Borrow.** Borrow shall consist of approved material secured from locations outside the roadway. The Contractor shall excavate, transport, and place the borrow material as specified in subsection 105.03.

After removal of borrow, the borrow areas shall be left free-formed rather than having rigid geometric shapes. Side slopes shall be as flat as practical, but not steeper than 1:4. Top and bottom of slopes shall be rounded with vertical curves to blend into adjacent terrain. Overburden, other than topsoil, if left in the borrow area, shall be graded to eliminate unsightly mounds.

Where practical, shape areas to drain, leaving usable land after completion. In granular soil, the area shall be left at least 12 inches above the high ground water level. In cohesive soil, the area shall be left at least 12 inches above the high water elevation of the drainage outlet.

Where the area cannot be drained, a pond or a wetland shall be created. Ponds shall be created by excavating to a minimum depth of 8 feet below normal ground water level in granular soil, or to 8 feet below the lowest drainage outlet in cohesive soil. Wetlands shall be created by excavation to a depth as directed.

All borrow areas shall be restored as shown on the plans or in a manner that will leave the land in a useful condition and with a natural appearance. Borrow areas within Department right-of-way shall be restored as required by contract documents. All ponded borrow areas shall be fenced unless otherwise directed.

Borrow areas outside Department right-of-way, covered by Act 451, Part 91 as amended, Soil Erosion and Sedimentation Control (formerly Act 347), shall be restored as per Act 451, Part 91, permit requirements. All other borrow areas, outside Department right-of-way, not left as ponds or wetlands, shall be topsoiled, seeded, fertilized and mulched. Borrow areas left as ponds or wetlands shall be topsoiled, seeded, fertilized and mulched above the normal water surface. Borrow areas not having existing topsoil shall be restored as approved. Materials and rates of application shall be as specified in section 815 or as approved. Where surrounding land use indicates, pine seedlings may be approved as an alternate for topsoil, fertilizer, seed and mulch. The spacing of pine seedlings shall be approximately 6 feet.

Boulders may be allowed to remain in the borrow area provided they are left in natural appearing positions.

The restoration requirements may be waived when the borrow is taken from the working area of an existing commercial source or when the property owner has a permit from an approved public agency allowing otherwise.

3. **Winter Grading.** All ice and snow shall be removed from the surface of the ground before embankment is placed.

If the original ground contains more than 4 inches of frost within the limits of 1:1 slopes spreading outward from the finished shoulders, the frozen material shall be removed entirely.

Any frozen material on a partially completed fill shall be removed before placing any more fill on the embankment. This frozen material shall be stockpiled in approved areas outside of the grading limits until thawed. The thawed material may be used in any portion of the embankment if it meets the moisture requirements at the time of use.

4. **Placing and Compacting Embankment.** After the ground area has been prepared as specified, embankments shall be constructed with sound earth or a mixture of sound earth and stones, broken rock, concrete or masonry except as provided for in the disposal of peat excavation material and as restricted for the top 3 feet of embankment. Frost heave textured materials shall not be placed in the top 3 feet of embankment below subgrade surface. Within the top 3 feet, the embankment shall be constructed to a uniformly stable condition by using a uniformly textured material. A minimum 50-foot longitudinal transition shall be used between two different textured materials.

Embankment materials shall be deposited and compacted by the controlled density method unless another method is specified or authorized, such as the 12-inch layer method, rock embankment method, or methods for treatment of peat marshes.

The Contractor shall not construct embankments by methods that create an unstable slope condition. Unstable slope conditions may result by placing impervious material on the outside of embankments blocking the drainage of granular materials, or placing a combination of pervious and impervious material in the embankment creating potential pockets of saturated material. Peat excavation materials shall not be placed in upland areas between the 1:1 slope extending down from the subgrade surface/front slope intercept point and the final plan fill slope in fills over 14 feet high.

Stones occurring within construction limits and broken rock from rock cuts may be placed in embankments. The stones and broken rock shall be 12 inches or less in greatest dimension and shall be placed in layers. All voids shall be completely filled with sound earth and compacted to not less than 95 percent of its maximum unit weight. In no case shall the stones and broken rock layers be placed within 3 feet of the subgrade surface.

Where filling in layers of the specified thickness is not feasible, as in the case of filling in water or constructing on poorly drained soil, the embankment may be constructed in one layer of granular material Class III to the minimum elevation at which the equipment can be operated as determined by the Engineer. The fill material placed in this manner shall be thoroughly compacted. Above this elevation, the embankment construction shall be according to the controlled density method.

Embankment construction adjacent to any structure shall be backfilled and compacted as specified in subsections 205.03.I and 206.03.B. All other embankment and backfill construction shall be as follows:

- a. **Controlled Density Method for Embankment.** Cohesive material for embankments shall be deposited and spread in layers not more than 9 inches in depth, loose measure, and extending to the full width of the fill area. Granular material may be deposited, spread, and compacted in layers not more than 15 inches in thickness if the specified density is attained.

At the time of compaction, cohesive material shall have a moisture content of not greater than 3 percent above optimum. If granular material is used, it shall be at a point short of saturation, as determined by the one-point cone chart in the *Density Control Handbook*. Moisture content of cohesive material in the top 3 feet of embankment shall not exceed optimum. If the material contains an excess of moisture, it shall be dried to the required moisture content before being compacted. Each layer of material shall meet moisture requirements and be compacted to not less than 95 percent of its maximum unit weight before the succeeding layer is placed.

If the specified percentage of maximum unit weight and the specified moisture content have been attained but the compacted material is not sufficiently stable to provide proper support for the subbase, the Engineer may direct that the material be dried by aeration and recompacted. The aeration may be accomplished by diskings or manipulation by other approved means.

- b. **Twelve-Inch Layer Method.** The material shall be deposited and spread in layers not more than 12 inches in depth, loose measure, parallel to the finished grade, and extending to the full width of the embankment. The material shall be deposited by operating the hauling equipment over the layer being placed. Each layer shall be compacted to not less than 95 percent of its maximum unit weight as specified under the twelve-inch layer method test in the *Density Control Handbook*.
- c. **Rock Embankment.** Rock embankment shall be constructed of shattered rock obtained by blasting or ripping. Shattered rock shall not exceed a maximum size of 12 inches in greatest dimension and shall be deposited on the fill and pushed over the end of the fill. The rock embankment shall be placed in layers not to exceed 3 feet in thickness. Depositing the shattered rock directly over the end of the fill from the hauling equipment will not be permitted. The surface of the rock embankment shall be choked with rock fragments and rock fines to prevent infiltration of the earth embankment. Where insufficient rock fines are available to properly choke the surface of the rock embankment, granular material Class III shall be used.

This method shall not be used in fills less than 1.5 feet in depth. In no case shall the stones and broken rock layers be placed within 3 feet of the subgrade surface. Where structures are located under rock embankment they shall be covered with not less than 24 inches of granular material Class III before the rock embankment is placed over the structures.

I. Structure Embankment.

1. **Compaction of Original Ground.** In fill areas on which a structure is to be built, the topsoil shall be removed from the area within the toe of slopes, as specified in subsection 205.03.A.1. After removal of the topsoil the area shall be compacted to not less than 95 percent of its maximum unit weight, to a depth of 9 inches.
2. **Placing Structure Embankment.** Structure embankments shall be placed and compacted to the limits shown on the plans prior to casting overlying footings. Structure embankments shall be protected from freezing until overlying footings are cast. The material used for structure embankment and the compaction required shall be as follows:
 - a. **Under Structure Footings Supported by Piling.** The structure embankment shall be constructed of granular material Class III within the limits shown on the plans except sound earth will be permitted as an alternate material for such embankments placed between April 1 and November 15. Sound earth shall meet the requirements specified in subsection 205.01 except that rocks or broken concrete shall be less than 3 inches in greatest dimension. The structure embankment shall be deposited and compacted by the controlled density method.
 - b. **Under Structure Footings When Piling is Not Specified.** The structure embankment shall be constructed of granular material Class III within the limits shown on the plans and shall be deposited and compacted by the controlled density method. The compaction required will be 100 percent of its maximum unit weight within the limits of 1:1 slopes spreading outward in all directions from the bottom edge of the structure footings.
3. **Winter Grading for Structure Embankment.** Embankment construction during winter weather shall conform to the requirements specified in subsection 205.03.H.3 with the following addition. Before placing an embankment to support a structure, all ground containing frost within limits of 1:1 slopes spreading outward in all directions from the bottom of structure footings, shall be removed. This frozen material shall be stockpiled outside of the grading limits in approved areas until thawed.

- J. **Machine Grading.** Machine grading shall normally consist of light grading to an approximate depth of 12 inches. The excavation from ditches and roadbed may be utilized in shaping shoulders and adjacent fills, if approved.

The work shall include all necessary scarifying, plowing, disking, moving, compacting, and shaping the earth to develop the cross section shown on the plans. Ditches shall be graded to drain runoff waters. All intersections, approaches, entrances, and driveways shall be graded as shown or as directed. Loading or hauling of material will not be required for this item.

- K. **Intercepting Ditch.** Intercepting ditch shall consist of constructing ditches at the locations shown on the plans, or as directed for control of erosion.

L. **Temporary Railroad Crossing.** Temporary railroad crossing shall be according to subsection 107.20.

M. **Granular Blanket.** The work of granular blanket includes excavating the unstable soil in the slope and backfilling within the limits and to the depth shown on the plans or as directed. Excavated material shall be disposed of according to subsection 205.03.P.

1. For granular blanket, Type 1, the excavated area shall be backfilled with granular material Class II.
2. For granular blanket, Type 2, the excavated area shall be dressed with a nominal 3-inch layer of granular material Class II prior to placement of the drainage layer. The drainage layer shall be constructed of one of the following:
 - a. 2-inch layer of open-graded aggregate with geotextile blanket above and below.
 - b. Three-dimensional mesh with geotextile blanket above and below.
 - c. Other geocomposite section as approved.

A minimum 12- inch layer of granular material Class II shall be placed on the drainage layer to bring the slope and ditch section to the established elevation and cross section. Underdrains constructed adjacent to, or as a part of the slope protection work shall be constructed according to section 404.

N. **Trimming and Finishing Earth Grade.** After the earth grade has been constructed to the required grade, all exposed stones and rocks more than 3 inches in diameter shall be removed.

The subgrade shall be trimmed to the grade called for on the plans. Where a subbase is required, the subgrade shall be trimmed to the established grade within \pm one inch. Where a subbase is not required, the subgrade shall be trimmed to the established grade within $\pm \frac{3}{4}$ inch.

The earth grade outside the subgrade shall be trimmed, and shaped to the required lines, grades, and cross sections. Slopes shall be finished to Class B tolerance unless Class A tolerance is specified.

Class A slopes shall be finished to within \pm one inch of the average slopes shown on the plans. Measurement shall be made at right angles to the slope.

Class B backslopes shall be finished to within \pm 6 inches of the average slopes shown on the plans. Measurement shall be made at right angles to the slope. Abrupt variations in the finished surface will not be permitted. All debris and undesirable material shall be removed.

Class B fill slopes shall be finished to within $\pm 2\frac{1}{2}$ inches of the required grade and cross section from the outside shoulder line for a distance of 3 feet down the slope. The remainder of the fill slope shall conform to the requirements for Class B backslopes.

Where trees or other restrictions do not interfere, the tops of backslopes, bottoms of fill slopes and all other angles in the lines of the cross section shall be rounded to form vertical curves as shown on the plans or as directed. All transitions in length of vertical curves shall be gradual and shall present a uniform and attractive appearance. When ditches are constructed in peat, vertical curves may be omitted.

- O. **Channel Excavation.** Channel excavation shall consist of the removal and disposal of all materials, of whatever nature encountered, necessary for the purpose of bank trimming, straightening, widening, deepening or relocating the channel of the stream or watercourse; if masonry and concrete structures are encountered, they shall be removed and will be paid for according to section 204. All required work in the new channel shall be completed prior to diverting the stream flow to the new channel. All channels shall be maintained and kept free from debris until final acceptance of the channel.

- P. **Disposing of Surplus and Unsuitable Material.** The requirements of this subsection are not intended to create a legal obligation to the Department to ensure that the Contractor's responsibilities are fulfilled. The obligation for compliance rests directly and solely with the Contractor.
 - 1. **Definition of Wetlands and Floodplains.** Wetlands are defined in Federal Executive Order No. 11990 as "those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds." A similar definition is contained in the US Army Corps of Engineers Regulation 33 CFR Part 323.2(a) and in Michigan Act 451, Michigan Natural Resources and Environmental Protection Act, Part 303, and Wetland Protection, and Part 31, Floodplain Regulatory Authority.

Floodplains are defined as areas of land adjoining inland or coastal waters subject to flooding by the base flood. The base (100-year) flood is a flood or tide having a one percent chance of being exceeded in any given year.
 - 2. **Disposal Within the Right-of-Way.** Material shall not be disposed of, either temporarily or permanently, beyond the normal plan fill slope across any wetland or floodplain. Disposal of material within the right-of-way to fill low areas or to flatten slopes, may be allowed at the Contractor's expense. Burying, piling, or placing of material in a safe and scenic manner in selected areas within the right-of-way may be allowed at the Contractor's expense.
 - 3. **Disposal Outside the Right-of-Way.** Material shall not be disposed of, either temporarily or permanently, in any wetland or floodplain. The Contractor shall obtain and file with the Department written permission from the owner of the property if

disposal is outside of the right-of-way. The disposal and restoration shall be as specified in subsection 205.03.H.2 at the Contractor's expense.

4. **Contractor Responsibility.** It shall be the sole responsibility of the Contractor to contact the appropriate regulatory agencies for a determination of what a regulated wetland or floodplain is prior to disposing of surplus or unsuitable material in such areas outside the right-of-way that are not indicated on the plans as disposal sites. Any surplus or unsuitable material disposed of by the Contractor in any portion of a wetland or floodplain not provided for on the plans shall be immediately relocated to an upland site at the Contractor's expense. The vacated area shall be restored as required by the regulatory agencies. Any restoration so ordered will be at the Contractor's expense. Requests for extensions of contract time, without assessment of liquidated damages, will not be allowed.
5. **Notification to Regulatory Agencies.** If it comes to the attention of the Department that the Contractor may have disposed of surplus or unsuitable material in any portion of a wetland or floodplain not shown on the plans, the Department shall notify the regulatory agencies for enforcement action as appropriate.

205.04 Measurement and Payment.

Contract Item (Pay Item)	Pay Unit
Excavation, Earth	Cubic Yard
Excavation, Rock	Cubic Yard
Excavation, Peat	Cubic Yard
Backfill, Swamp	Cubic Yard
Subgrade Undercutting, Type ____	Cubic Yard
Subgrade Manipulation	Square Yard
Embankment, LM	Cubic Yard
Embankment, CIP	Cubic Yard
Embankment, Structure, CIP	Cubic Yard
Machine Grading	Station
Ditch, Intercepting	Station
Excavation, Channel	Cubic Yard
Granular Blanket, Type ____	Cubic Yard
Granular Material, CI ____	Cubic Yard

- A. **Roadway Earthwork Volumes.** Unless otherwise specified, roadway earthwork volumes will be computed either by average end areas, using cross sections determined from original and final elevation measurements, or by the staked-section method.

The staked-section method will use original cross sections taken preceding construction and slope stake and grade stake data from field notes for computation of earthwork quantities. Quantities will be adjusted for any change in design or authorized deviation from the established grade and cross section. Sufficient measurements will be taken during construction to verify conformance to the required grade and cross section.

B. General.

1. Payment for work and materials required to build, maintain, remove, and restore borrow haul routes will be considered as having been included in the contract unit prices bid for other contract items.
 2. When buried rubbish and trash is encountered that is not indicated on the plans or in the proposal, subsection 103.02.C shall apply.
 3. Removing topsoil and other selected excavated materials from embankment areas will be measured and paid for as **Excavation, Earth**.
 4. Topsoil and frozen material removed to facilitate the Contractor's operations will be at the Contractor's expense. If the progress clause set up in the proposal specifically requires the Contractor to construct embankments during the winter, the frozen material removed and the embankment required to replace it will be paid for at the contract unit prices for **Excavation, Earth** and **Embankment** respectively. The winter grading limits will be as directed by the Engineer.
 5. Compaction of existing material in embankment and cut sections, after topsoil stripping, will not be paid for separately, but will be considered as included in the contract unit prices bid for other contract items.
 6. **Granular Material CI II** and **Granular Material CI III** will be measured in place, by volume. **Granular Material CI III** required for filling in water or constructing on poorly drained soil, will be measured and paid for as **Backfill, Swamp**.
 7. **Underdrains, Bank** will be measured and paid for in accordance with subsection 404.04.
 8. Trimming of the subgrade and slopes to the specified tolerances shall be considered included in the prices bid for other items of work.
 9. Restoration of borrow and disposal areas shall be at the Contractor's expense.
 10. **Excavation, Channel** will be measured by volume, in its original position.
 11. **Intercepting Ditch** will be measured by length along the center of the ditch in stations.
- C. **Excavation, Rock** will be measured by the staked section method with no allowance for overbreak. Overbreak is the material removed outside the plan or authorized cross section for rock excavation. No deduction will be made for rock projecting inside the lines of the cross section within the limits specified. The removal of the overburden will be measured and paid for as **Excavation, Earth**. Boulders over 0.5cubic yard in volume will be measured individually and the volume computed from average dimensions taken in three directions.

D. Peat Excavation and Swamp Backfill.

1. Measurement of total **Excavation, Peat** will be in its original position.
2. Measurement of partial **Excavation, Peat** and displacement will include the volume of the peat excavated to form the trench, and the excavation of the upheaved peat in the trench. The volume of upheaved peat to be removed from the trench will be estimated at 100 percent of the actual peat displaced. Peat displaced outside the pay limits shown on the plans will not be included in the pay quantity. Sufficient borings to determine the depth of displacement to be used in computing pay quantities will be made by the Department.
3. Excavation of peat, muck, marl, and underlying very soft clay will be paid for as **Excavation, Peat**.
4. In the treatment of peat marshes, no claims will be allowed for delays of less than 60 days caused by the Department's testing and determining methods of correction. Any corrective work necessary in areas where the total excavation method is required will be at the Contractor's expense.

For any corrective work necessary in areas where the partial peat excavation and displacement method is specified or directed, the costs will be shared equally between the Department and the Contractor. Payment for the corrective work includes all labor, material, and equipment necessary to perform the work, including excavation and relief trenches, if required.

If a time surcharge is recommended, the Contractor shall be paid for one-half of the swamp backfill quantity required for the surcharge. After stabilization of the backfill, or after the required settlement has occurred, the Contractor will be paid for one-half of the quantity of swamp backfill removed as earth excavation.

If excavation or relief trenches are required, the costs will be shared equally between the Department and the Contractor.

5. When called for on the plans, placement of temporary surcharge will be paid for at the contract unit price for **Embankment, CIP** or **Backfill, Swamp**. The removal of surcharge will be paid for as **Excavation, Earth**.
6. The work required for maintaining a temporary surcharge that is moved forward as the fill progresses will not be paid for separately.
7. **Backfill, Swamp** will be measured in its original position when practical. To facilitate measurement, the Contractor shall designate and isolate an area in the borrow pit or roadway cut for the exclusive source of material for **Backfill, Swamp** and excavation shall be done in an orderly manner. When more than initial and final cross sections are required to measure and compute the volume of material removed, the Contractor will be required to pay for the cost of additional cross sections and computations. If it is not practical to calculate the volume of **Backfill, Swamp** in its original position, the volume

will be computed within the limits shown on the plans, or from borings taken in the fill, and will then be increased by 15 percent. The **Backfill, Swamp** volume will not be increased by 15 percent when the peat excavation results in a dry hole.

Backfill, Swamp used to construct sand core fills, as detailed in the plans and/or as directed by the Engineer, shall not receive the 15 percent increase as previously described.

E. Subgrade Undercutting and Subgrade Manipulation.

1. **Subgrade Undercutting** will be measured in its original position. No deduction will be made in subgrade undercut quantities for those areas where an underdrain is installed. There will be no adjustment in the contract unit price for any quantity changes of the type of **Subgrade Undercutting** specified. Payment for this contract item includes the removal and disposal of undesirable material and replacement with material of the type specified.
2. **Subgrade Manipulation** will be measured for payment only in designated areas.

F. Earth Excavation and Embankment.

1. **Embankment, LM** will be measured by volume, loose measure. The contract price is payment in full for furnishing, hauling, placing, and compacting the material at the required locations.
2. The work of stepping side slopes will be considered included in the work of constructing roadway embankments and will not be paid for separately.
3. When determined by the Engineer, quantities for **Excavation, Earth** and **Embankment, CIP** will be based on plan quantities. Surplus or unsuitable material disposed of outside the plan cross sections will not be included in the pay quantities for embankment materials.
4. When the Engineer determines that it is not feasible to determine quantities based on plan quantities, measurement for **Excavation, Earth** and **Embankment, CIP** will be as follows:
 - a. **Excavation, Earth** will be measured by volume, utilizing the staked-section method except when excavation is performed without predetermined excavation limits.
 - b. **Embankment, CIP** will be measured by volume, based on the grade and cross section shown on the plans or authorized, utilizing the staked-section method. No allowance will be made for possible increase in quantity of fill material required due to normal consolidation of the natural ground under the embankment. When surplus or unsuitable material is disposed of outside the plan cross sections, it will not be measured as **Embankment, CIP**.

5. If material is removed in embankment areas to a greater depth than specified, payment for **Excavation, Earth; Embankment, CIP** and **Embankment, Structure, CIP** will be made only for the amount specified or as directed.
 6. **Embankment, Structure, CIP** will be measured by volume, based on the grade and cross section shown in the plans, utilizing the staked-section method. No allowance will be made for possible increase in quantity of fill material required due to normal consolidation of the natural ground under the embankment.
 7. Sound earth, when used as structure embankment under pile-supported footings, will be measured and paid for as **Embankment, CIP**.
- G. **Machine Grading** will be measured by length along the edge of surface. Each side of the road, where work is performed, will be measured separately.
- H. **Granular Blanket.**
1. **Granular Blanket, Type 1** will be measured in place by volume, which includes the volume of granular material Class II, within the limits and to the depth shown on the plans or authorized.
 2. **Granular Blanket, Type 2** will be measured and paid for in place, by volume, which includes the volume of the drainage layer and the volume of granular material Class II, within the limits and to the depth shown on the plans or as authorized.